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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/561,957	12/22/2005	Tsuyoshi Nishizawa	126273	3542

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EXAMINER	
MALEKZADEH, SEYED MASOUD	
ART UNIT	**PAPER NUMBER**
1722	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/03/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/561,957	NISHIZAWA, TSUYOSHI	
	Examiner	Art Unit	
	SEYED MASOUD MALEKZADEH	1722	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 December 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *16-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *16-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 December 2005* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *02/06/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

An initialed and dated copy of Applicant's IDS form 1449 filed on 02/06/2006, is attached to the instant Office action.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 28 and 32 are rejected under 35 U.S.C. 102 (b) as being anticipated by Nam et al (US 5,527,565)

Claim 28 and 32 are drawn to a product which is obtained by the process and therefore will be treated as required via MPEP 2113 [R-1].

> "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." (MPEP 2113[R-1])

Schmolke et al (US 2002/0022351) teaches a silicon epitaxial wafer grown on a substrate having a polished surface. (See paragraphs 23,26, and 34). The prior art, thus, meet all the claim limitations, and therefore, Schmolke et al ('351) anticipate the claims 28 and 32.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 16-27 and 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Standley et al. (WO 01/86035; prior art cited by the applicant) in view of Sato et al (6,593,211)

Standley et al. (WO 01/86035) teaches a method of producing a silicon epitaxial wafer, comprising a hydrogen heat treatment step of arranging a susceptor capable of mounting a silicon single crystal substrate within a reactor and subjecting the silicon single crystal substrate mounted on the susceptor to heat treatment in a hydrogen

atmosphere (See pages 2 and 32-34); and a vapor phase epitaxy step of epitaxially growing a silicon epitaxial layer after the hydrogen heat treatment step(See pages 2 and 17-22), wherein the silicon single crystal substrate is separated from the susceptor during the hydrogen heat treatment step (See pages 5 and 26-33) and the silicon single crystal substrate is mounted on the susceptor during the vapor phase epitaxy step.

Standley et al. ('035) further teaches the silicon single crystal substrate is separated from the susceptor by allowing a lift pin which vertically moves the silicon single crystal substrate relatively to the susceptor to support the silicon single crystal substrate. (See pages 34-38)

Also Standley et al. ('035) discloses the hydrogen heat treatment step is performed at a temperature lower than a vapor phase epitaxy temperature of the silicon epitaxial layer. (See pages 20 and page 44)

Moreover, Standley et al. ('035) teaches in the hydrogen heat treatment step, a temperature within the reactor when the silicon single crystal substrate is separated from the susceptor is at least 900°C. (Pages 45-46)

Standley et al. ('035) also teaches comprising a cleaning step of cleaning the silicon single crystal substrate before the hydrogen heat treatment step, wherein the cleaning step has natural oxide film removal cleaning for removing an oxide film formed on a rear main surface of the silicon single crystal substrate, and the natural oxide film removal cleaning is performed as final cleaning of the rear main surface. (Pages 2,3, and 4)

Further Standley et al. ('035) discloses in the natural oxide film removal cleaning, the natural oxide film is cleaned and removed using hydrofluoric acid. (Pages 8, 17 and 18)

Also Standley et al. ('035) teaches the cleaning step has front main surface oxide film formation cleaning, which is performed as final cleaning of the front main surface. (pages 17, 18, and 19)

Standley et al. ('035) further teaches a time for the silicon single crystal substrate to be stored in air during the period that the substrate is fed into the reactor after the final cleaning is set within 10 days. (Page 5)

Standley et al. ('035) further teaches the silicon single crystal wafer is a double-sided mirror silicon single crystal substrate of which both the main surfaces are subjected to mirror polishing finish. (Pages 1 and 2)

Standley et al. ('035) also teaches a cleaning step of cleaning a silicon single crystal substrate; and a vapor phase epitaxy step of mounting the silicon single crystal substrate on a susceptor arranged within a reactor with a non-oxidizing atmosphere and epitaxailly growing a silicon epitaxail layer after the cleaning step, wherein the cleaning step, front main surface oxide film formation for forming an oxide film on a front main surface of the silicon single crystal substrate is performed as final cleaning of the front main surface and rear main surface natural oxide film removal cleaning for removing a natural oxide film formed on a rear main surface of the silicon single crystal substrate is performed as final cleaning of the rear main surface. (Pages 17-19, 23-24, and 26)

However, Standley et al. (WO 01/86035) does not teach to subject the silicon single crystal substrate mounted on the susceptor to a heat reatment in a hydrogen atmosphere.

In the analogous art, Sato et al. (6,593,211) teaches a method of producing a silicon epitaxial wafer wherein the method comprises subjecting the silicon single crystal substrate mounted on the susceptor to a heat treatment in the present of hydrogen. (See abstract and lines 16-67 column 19 and lines 1-59 column 20)

It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify Standley et al. ('035) to subject the silicon single crystal substrate mounted on the susceptor to a heat treatment in a hydrogen atmosphere in order to decrease the amount of defect density in the silicon single crystal substrate.

Claims 33-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Standley et al. (WO 01/86035) in view of Schmolke et al. (2002/0022351)

Standley et al. ('035) discloses a silicon epitaxial wafer comprising a silicon epitaxail layer formed on a front main surface of a double sided mirror silicon single crystal substrate which both main surfaces are subjected to mirror polishing finish, however, Standley et al. ('035) does not teach a haze level of main surface is between 0.1 ppm and 50 ppm.

In the analogous art, Schmolke et al. (2002/0022351) teaches a silicon epitaxial wafer having a front and a back surface and an epitaxial layer which the epitaxially grown silicon surface has a haze level of less than 0.2 ppm. (paragraph [0027])

It would have been obvious to one of ordinary skill in the art at the time of the applican's invention to modify Standley et al. (WO 01/86035) to specify the haze level of the silicon epitaxial wafer surface in order to measure surface roughness of the silicon wafer, as suggested by Schmolke et al. (2002/0022351).

Remarks

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Seyed Masoud Malekzadeh whose telephone number is 571-272-6215. The examiner can normally be reached on Monday – Friday at 8:30 am – 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra N. Gupta can be reached on (571) 272-1316. The fax number for the organization where this application or proceeding is assigned is 571-272-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance form a USPTO

Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SMM

Robert Kunemund
Primary Examiner
TC 1700